Utah State Fire Marshal

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PORTABLE FIRE EXTINGUISHER SERVICE TRAINING

References

NFPA 10 - 2007 Edition

Portable Fire Extinguisher Rules – R-710.1

Prepared by the Utah State Fire Marshal (UFM)

The basic elements and procedures for the periodic inspection of fire extinguishers.

1. Location in designated place.
2. No obstructions to access or visibility
3. Operating instructions on nameplate legible and facing forward.
4. Safety seals and tamper, indicators not broken or missing.
5. Fullness determined by weighing or “hefting”.
6. Examinations for obvious physical damage, corrosion, leakage, obstructed hose and nozzles.
7. Pressure gauge reading or indicator in the operable range or position.
8. Condition of tires, wheels, carriage, hose, and nozzles checked (for wheeled units).
9. Electronic Monitoring devices and system in place with sensors and connectivity in place.
10. Labels and tags properly marked and attached.

Maintenance procedures shall include a thorough examination of the basic elements of a fire Extinguisher:

1. Mechanical parts of all fire extinguishers.
2. Extinguishing agent of cartridge or cylinder operated dry chemical, stored-pressure, loaded stream, and pump tank.
3. Expelling means of all fire extinguishers.

Internal examination during annual maintenance is not required for non-rechargeable fire extinguishers, carbon dioxide fire extinguishers, or stored pressure fire extinguishers, except for those types specified in table 10.7.3.1.1.2, see the following.

Inspection of Portable Pressurized Fire Extinguishers

Fire Extinguishers require an annual service inspection. NFPA 10:7.1.2.1

Dry Chemical (Stored Pressure)	Inspections –7.2.1.2 **30 day intervals**	Maintenance – 7.3.1.1.2 **1 Year**	Recharging – 7.4.1.1 **After every use or by inspection** or maintenance interval	Hydrostatic Test Not to exceed twelve **(12) year** intervals
Dry Chemical (Stainless Steel)	**30 day intervals**	**1 year**	**Five (5) years**	**Five (5) years**

Maintenance is to be performed by a trained person who has undergone the instructions necessary to reliably perform maintenance and has the manufacturer's service manual. 7.1.2

Maintenance, servicing and recharging shall be performed by trained and certified persons having available the appropriate servicing manuals(s), the proper types of tools, recharge materials, lubricants, and manufacturer's recommended replacement parts or parts specifically listed for use in the fire extinguisher. 7.1.2.2

Maintenance is to be performed in full compliance with the maintenance requirements of; Manufacturers recommendations, NFPA 10 Standards for Portable Fire Extinguishers 2007 Edition and Utah Rule R710.1

During the time period that fire extinguishers are removed from service for maintenance or recharge a replacement fire extinguisher suitable for the type of hazard being protected and of at least equal rating is to be provided. 7.1.3

Guidelines to Inspect and Service Dry Chemical Portable Fire Extinguishers:

1. Check the underwriter's label on the nameplate: 7.1.4.2
    a. Recharging instructions must be legible.
    b. Chemical content identified.
    c. Underwriter's classification readable.
2. Check for manufacturer's date or last hydrostatic test date.
    a. The hydrostatic retest shall be conducted within the calendar year of the specified test interval. 8.3.1.1
    b. If six (6) years has past since the last recharge, the extinguisher must be taken out of service, emptied and hydrostatically tested. 7.3.1.2.1
    c. If unable to locate date, hydrostatic test must be applied to the unit before placing into service. 7.3.2.4
3. Check cylinder for damage and possible need for hydrostatic testing. 8.1.3
    a. Dents, cuts in cylinder, rust or signs of having been in a fire require hydrostatic testing.

4. Visual check of pressure gauge.

    a. Pressure gauge needle or pointer shall be pointed in the green.
    b. Are gauge graphics straight in the unit?
    c. Is dial cover clear and readable?
    d. Is the gauge damaged in any fashion?

5. Pull Pin

    a. Break seal and pull pin.
    b. Is the pull pin straight and smooth?
    c. Does pin slide smoothly and with ease out of the retainer.

6. Operating lever and carry handles:

    a. Are the lever and carrying handle in good condition
    b. There should be no cuts or gauges in the metal.
    c. Are factory type rivets installed properly and without damage.

7. Nozzle and hose

    a. Check the hose for cracks, cuts or signs of age and ware
    b. Check the hose orifice for foreign objects, clogging or signs of use.
    c. Are the hose and nozzle fit properly and designed for the extinguisher brand.

8. Perform both an external and comprehensive internal examination of the cylinder. 7.3.2.2.1

9. Extinguisher Weight

    a. Check extinguisher weight on nameplate (located under inspection or maintenance area.)
    b. Weigh the extinguisher
    c. Do the weight listed and actual weight, coincide or match.
    d. Carefully match listed weight to the weight after the refill.

10. Clean cylinder 7.3.2.2

    a. Remove old labels
    b. Clean exterior of cylinder
    c. Reset existing or new pin, attach tamper seal, clean extinguisher and attach service tag.
    d. Replace needed stickers and service tags.

11. Labels and Service tags 10:7.3.3 and 7.3.3.1 and 7.3.3.2, A.7.3.3.2 and A.8.7.2

    a. A six (6) year service label shall be affixed with a non-heat application after service.
    b. Verification of Service Collar shall be applied after maintenance service.
    c. Written signature and EE number must be legible.
    d. Year, month, day and service performed shall be marked or punched into the tag.
    e. Type of service performed and extinguisher type shall be listed.

Guidelines to Inspect Dry-Chemical Cartridge Fire Extinguishers:

Dry Chemical (Cartridge)	Inspections –7.2.1.2 **30 day intervals**	Maintenance – 7.3.1.1.2 **1 Year**	Recharging – 7.4.1.1 **After every use or by inspection** or maintenance interval	Hydrostatic Test Not to exceed twelve **(12) year** intervals

Service Guidelines

1. Read Underwriters' label (it must be attached to the extinguisher and legible)

2. Find the date of manufacture and or the last hydrostatic test date.

3. Perform both an internal and external examination of the extinguisher. 7.3.2.4

    a. Look for cylinder damage; rust, cuts, dents or signs of heat damage.
    b. Determine if the extinguisher should be taken out of service or rejected due to damage.
    c. Determine if a hydrostatic test is needed.

4. Cartridge Service

    a. Carefully remove cartridge cover and cartridge.
    b. Operate the puncture lever to make sure the lever works freely.
    c. Check pressure relief vent for obstructions in the cartridge receiver.
    d. Check thread grooves in the cartridge receiver for damage.
    e. Remove and examine gasket in cartridge receiver.

5. Invert extinguisher and squeeze handle to relieve pressure in cylinder.

6. Open wheel cap and empty chemical contents from the cylinder in an approved manor.

7. Clean and examine the extinguisher internally.

8. Hose and Nozzle

    a. Examine hose and nozzle for cracks, nicks, age or heat damage.
    b. Using a compressor, blow through nozzle and hose to clear excess powder or obstructions.
    c. Check hose attachment threads and O-ring for damage.

9. Wheel Indicator Cap

    a. Examine wheel indicator cap threads for damage and replace if needed.
    b. Examine and clean the red indicator slide for smooth and proper operation.
    c. Examine wheel indicator cap gaskets for damage and replace if needed.
    d. Reset red indicator plunger.
    e. Non-indicator caps shall be removed from service and replace with a properly working indicator cap.

10. Refill extinguisher 7.4.1.3 and 7.4.1.3.1

    a. Use only the correct type of chemical listed for extinguisher type
    b. Only fill extinguisher cylinder to the listed weight for extinguisher type.
    c. Clean fill orifice threads and relief vent of any residual powder.

11. Replace indicator cap

    a. Hand tighten indicator cap to cylinder.

12. Pressurized Cartridge Replacement

    a. Examine the new or used cartridge and threads for damage.
    b. Make sure the cartridge examined is the proper and listed cartridge for the extinguisher type and size.
    c. Are the cartridge threads “left-handed threaded”?
    d. Determine proper weight for the cartridge (proper weight is stamped on the cartridge.)
    e. Weigh cartridge (One half (½) cartridge weight loss is allowed.).
    f. May be one-half (½) ounce on 20 or 30 pound extinguishers.
    g. Cartridges are to be hydrostatically tested every five (5) years.
    h. Cartridge is to be hand-tightened in the cartridge retainer (left-hand turn in the cartridge retainer.)

13. Replace cartridge guard

14. Attach tamper seal, clean extinguisher, and attach service tag.

Guidelines to Inspect Stored Pressure Clean Agent Fire Extinguishers:

Clean Agents	Inspections –7.2.1.2 **30 day intervals**	Maintenance – 7.3.1.1.2 **1 Year**	Recharging – 7.4.1.1 **After every use or not to exceed six (6) year** maintenance interval	Hydrostatic Test Not to exceed twelve **(12) year intervals**

Service Guidelines

1. Read Underwriters' label (it must be attached to extinguisher cylinder.

2. Find the date of manufacture or last hydro-test date.

3. Complete an external examination of the fire extinguisher unit.

    a. Look for cylinder damage; rust, cuts, dents or signs of heat damage.
    b. Determine if the extinguisher should be taken out of service or rejected due to damage.
    c. Determine if a hydrostatic test is needed.

4. Extinguisher Weight

    a. Weigh extinguisher and compare with manufacturers full-weight printed on extinguisher label.
    b. Recharge extinguisher to correct weight should the weight not agree with manufacturer listing.

5. Pressure Gauge

    a. Visually inspect the pressure gauge.
    b. If gauge pressure needle or pointer is not in the green or shows loss or overcharge of pressure, then depressurize extinguisher.
    c. Re-charge to accurate pressure reading.

6. Pull Pin

    a. Remove pull pin from pin-slide and valve assembly
    b. Check for free movement of the pin.
    c. If the pin is bent, spurred, or damaged in any way, replace with new pull pin.

7. Hose and Horn

    a. Inspect hose and horn for cracking, degrading, age or heat damaged.
    b. Check the hose and horn for obstructions
    c. Blow nitrogen through hose and horn to insure clear passage through.
    d. Clean attachment threads and replace O-rings if necessary

8. Re-charge

    a. Recharge to correct pressure and weight

9. Install new tamper seal and clean extinguisher body, apply service label and tags.

Note:

- Labels shall be applied with a heatless process and designed to be self destructive upon removal.

- Pressure gauges shall be capable of being read to within one percent of the test pressure. Pressure gauges used on the test equipment are to be calibrated semiannually. 8.2.1.4

Inspection Procedures for Carbon Dioxide Fire Extinguishers:

Carbon Dioxide	Inspections –7.2.1.2 **30 day intervals**	Maintenance and ensure conductivity exists. 7.3.1.3 **1 Year**	Recharging – 7.3.1.1.2 **Five (5) years or by inspection** or maintenance interval	Hydrostatic Test Not to exceed five **(5) year** intervals

Service Guidelines:

Read Underwriters' label (it must be attached to extinguisher cylinder body.

1. Find the date of manufacture or last hydro test date.

2. Complete an external examination of the fire extinguisher unit.

    a. Look for cylinder damage; rust, cuts, dents or signs of heat damage.
    b. Determine if the extinguisher should be taken out of service or rejected due to damage.
    c. Determine if a hydrostatic test is needed.

3. Extinguisher Weight

    a. Weigh extinguisher and compare with weight stamped on the valve.
    b. Recharge if weight loss is greater than ten (10%) percent.

4. Pull Pin

    a. Remove pull pin from pin-slide and valve assembly
    b. Check for free movement of the pin.
    c. If the pin is bent, spurred, or damaged in any way, replace with new pull pin.

5. Hose and Horn

    a. Remove and check horn or hose and horn assembly for cracking, degrading, age or heat damage.
    b. Check the hose and horn for obstructions.
    c. Blow nitrogen through hose and horn to insure clear passage through the hose.
    d. Clean attachment threads and replace o-rings if necessary.

6. Check to insure that there is a diffuser, and that it is not clogged or obstructed.
7. With the horn reattached to the discharge tube, check the movement of the swivel joint for binding or being too loose.

8. Perform a hose conductivity test. 7.3.1.3

    a. Conductivity test results shall be recorded on a suitable label and applied to extinguisher by a heatless process.
    b. Test equipment shall be calibrated at least semiannually. 8.2.1.4
    c. When test is complete and assembly passed, apply the "Conductivity Tested Label" to unit. A.7.3.1.3

9. Recharge 7.4.1.3

    a. Recharge to correct weight and pressure.

10. Service Tags 7.3.3

    a. Written signature and EE number need to be legible.
    b. Year, month, day and service performed should be marked or punched on the tag.
    c. Type of service performed, extinguisher type.

11. Full Service Extinguisher

    a. Install new tamper seal
    b. Clean extinguisher body
    c. Remove old labels from cylinder
    d. Apply completed service labels and tags.

Wheeled CO2 Fire Extinguishers

Inspection and Recharging Procedures for Pressurized Water Fire Extinguishers:

Water Type Extinguishers include: water, antifreeze, wetting agent, and loaded stream fire extinguishers

Note: Recharging procedures should be followed after any use of the extinguisher and after the conducting of hydrostatic testing.

Water (Stored Pressure)	Inspections –7.2.1.2 **30 day intervals**	Maintenance – 7.3.1.1.2 **1 Year**	Recharging – 7.4.1.1 **After every use, by inspection** or at maintenance intervals	Hydrostatic Test Table 8.3.1 Not to exceed five **(5) year** intervals

Recharging:

1. Discharge extinguisher into a container. (Retain expelled charge for testing.)
2. At the top of the cylinder, loosen hex nut with a spanner or open-end wrench (Do not use a pipe wrench for this operation.)
3. Remove valve assembly
4. Remove overfill tube and examine for damage.
5. Flush the cylinder shell with clear tap water.
6. Test retained charge using a "hydrometer" (automotive engine coolant type) to determine freeze point.
7. Examine interior of shell for obvious evidence of corrosion or damage.
8. Examine threaded (mail thread) collar for evidence of damaged threads. (Shells with severely damaged threads must be scrapped.)
9. Remove siphon tube from valve. Examine for evidence of cracks or other damage. (Replace siphon tube assembly if any damage is found.
10. Remove spring and valve stem assembly. Clean as required. Replace spring if compression value of spring has been significantly reduced.
11. Carefully examine plunger. If seal has taken a set, which may prevent proper pressure seal, replace with factory furnished part. It is important to lubricate o-ring lightly prior to reinstallation.
12. Examine neck o-ring for evidence of damage, wear or imbedding of foreign material. Replace if necessary, using appropriate part. It is important to lightly lubricate o-ring upon reinstallation.

13. Check threads of union (Hex) ring.
14. Clean interior of valve and other components with soft brush (toothbrush) and lint free cloth. Lightly lubricate plunger seal and o-ring with silicone grease and re-insert into valve. Re-assemble valve.

15. Carefully, fit the overfill tube into the shell avoiding a strained or cocked condition.

16. Fill shell with water or anti-freeze charge until it rises up through the overfill tube. Fill level is the bottom of the overfill tube.

17. Install valve assembly being careful not to cross thread the union (hex) ring. Tighten with spanner or open-end wrench. (Do not use a pipe wrench for this operation.)

18. Pressurize (with compressed air or nitrogen, both regulated to operating pressure of extinguisher at source) until 100 p.s.i. is reached on charging system gauge. Check extinguisher gauge accuracy by using calibrated gauge with air chuck at "Schrader valve".

19. Leak check at all potential leakage points. Use mild soapy solution or commercially available solution such as "Leak-Tek". Clean off afterward with water. Air dry.

20. Re-install hose assembly.

21. Insert a clean, straight pull pin and tie on with a new tamper seal. Attach a completely filled out and dated recharge tag.

22. Wetting Agents

    a. The agent in stored-pressure wetting agent fire extinguishers shall be replace annually.

Inspection and Recharging Procedures for AFFF and FFFP Fire Extinguishers:

1. The premixed agent in liquid charged-type AFFF and FFFP fire extinguishers shall be replaced at least once every three (3) years. 7.4.2.3.1

2. Only the foam agent indicated on the extinguisher nameplate shall be used for recharge.

3. In non-pressurized AFFF and FFFP fire extinguishers that are subjected to agent analysis shall not be required to comply with 7.4.2.3.1.

Inspection and Recharging Procedures for Wet Chemical Fire Extinguishers:

Note: Recharging procedures should be followed after any use of the extinguisher and after the conducting of hydrostatic testing.

Wet Chemical (Stored Pressure)	Inspections –7.2.1.2 **30 day intervals**	Maintenance – 7.3.1.1.2 **1 Year**	Recharging – 7.4.1.1 **After every use, by inspection** or at maintenance intervals	Hydrostatic Test Table 8.3.1 Not to exceed five **(5) year** intervals

Service Guidelines:

1. Read Underwriters' label (it must be attached to extinguisher cylinder body.

2. Find the date of manufacture or last hydro test date.

3. Complete an external examination of the Wet Chemical fire extinguisher unit.

    a. Look for cylinder damage; rust, cuts, dents or signs of heat damage.
    b. Determine if the extinguisher should be taken out of service or rejected due to damage.
    c. Determine if a hydrostatic test is needed.

4. Extinguisher Weight

    a. Weigh extinguisher and compare with weight stamped on the label.
    b. Recharge if wet chemical extinguisher was partially discharged. All remaining agent shall be discarded. 7.4.3.11.2

5. Pressure Gauge

    a. Visually inspect the pressure gauge.
    b. If gauge pressure needle or pointer is not in the green or shows loss or overcharge of pressure, then depressurize extinguisher.

c. Re-charge to accurate pressure reading.

6. Pull Pin

   a. Remove pull pin from pin-slide and valve assembly
   b. Check for free movement of the pin.
   c. If the pin is bent, spurred, or damaged in any way, replace with new pull pin.

7. Hose and Nozzle

   a. Remove and check hose and nozzle assembly for cracking, degrading, age or heat damage.
   b. Check the hose for obstructions.
   c. Blow nitrogen through hose to insure clear passage through the hose.
   d. Clean attachment threads and replace o-rings if necessary.
   e. Hose and wand assemblies shall be replaced by hose and nozzle assembly.
   f. Check to insure that the diffuser is not clogged.

8. Recharge

   a. Recharge to correct weight and pressure.

9. Service Tags

   a. Written signature and EE number need to be legible.
   b. Year, month, day and service performed should be marked or punched on the tag.
   c. Type of service performed, extinguisher type.

10. Full Service Extinguisher

   a. Install new tamper seal
   b. Clean extinguisher body
   c. Remove old labels from cylinder
   d. Apply completed service tag.

Hydrostatic Test and Pressures
("Non-D.O.T." Fire Extinguishers Only)

Pre-test operations: Before testing the tank, it shall be emptied, be cleaned with no residual caked powder or residue remaining, and the interior shall be lighted for a full interior damage review. 8.5.1.2 Any distortion of the shell shall be cause for rejection. 8.5.2.5 Where the extinguisher shell or cartridge have one or more areas of the conditions found in NFPA 10:8.4.2 the tank or cylinder shall not be tested.

Should a corrosion, cuts, gouges or dings have removed more than 10 percent of the cylinder thickness or a dent in the cylinder includes a weld and or exceeds one quarter (1/4) inch in depth the cylinder or tank shall be condemned and not tested. 8.7.2.(1)(2)(3) and 8.4.2 and 8.4.2(7)(8)

All valves internal parts and hose assemblies shall be removed. 8.5.1.2. However, Manufacturers Recommendations may require certain internal parts shall not be removed. 8.5.1.2.1.

Relief devices shall be removed and all tests shall be conducted using test fittings and adaptors. 8.5.2.4

Stored Pressure Types: All stored pressure and bromochlorodefluomethane (Halon 1211) types of extinguishers shall be hydrostatically tested at the factory, test pressure not to exceed 3 times the service pressure. This pressure is to be maintained for a minimum of 30 seconds. A drop in pressure on the test gauge during the test procedure is cause for a retest or rejection of the cylinder. 8.5.2.6. This group includes dry chemical and water pressure extinguishers. 8.5.1.1

Cylinder and hose assemblies shall be tested within a protective cage device or placed behind a protective shield that permits visual observation while under pressure. 8.2.4.1

EXAMPLE #1

Factory test 500 p.s.i.
Service Pressure on Gauge 100 p.s.i.
Hydrostatically tested at manufacturers listed pressure or 300 p.s.i.

EXAMPLE #2

Factory test 390 p.s.i.
Service Pressure on Gauge 195 p.s.i.
Hydrostatically tested manufacturers listed pressure or at 390 p.s.i.

Where there is no pressure specified on the extinguisher nameplate the extinguisher shall be tested not to exceed three times the normal operating pressure. 8.6.1.1

Post Test: To dry the interior of the cylinder heated air is to be used at a temperature not to exceed 150° F (66° C) inside the shell.
Hydrostatic test labels are to be applied to the cylinder with month and year test was performed, test pressure, name of agency performing the test. 8.7.2.1

Cylinders tested by volumetric expansion (water jacket) test method shall be marked with a retester

identification number (RIN) on the label. 8.7.2.3(1)
Cartridge Dry Chemical Type: Cartridge operated dry chemical and dry powder types of extinguishers shall be hydrostatically tested at their original factory test pressure as shown on the nameplate or shell.

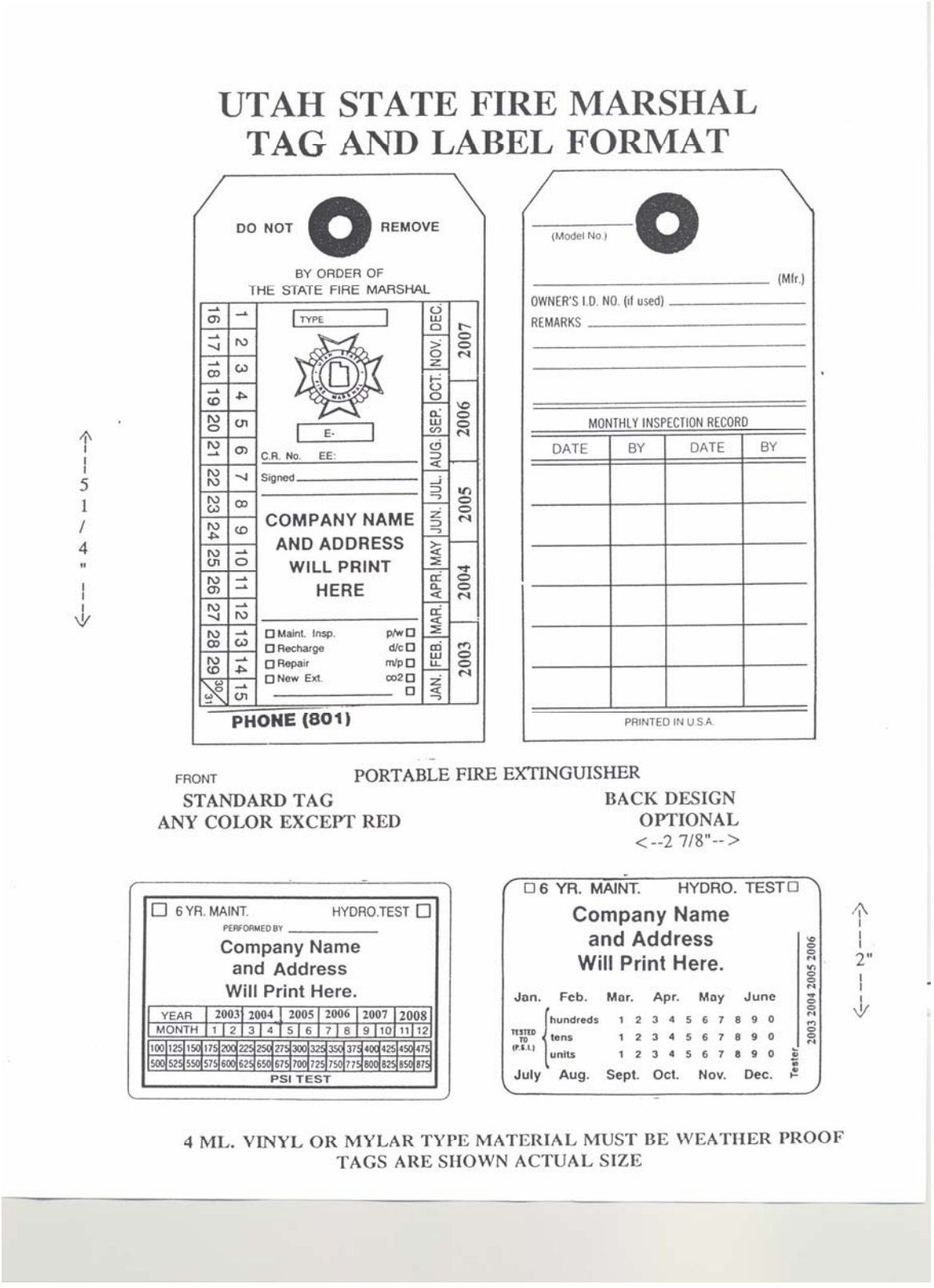
The test interval shall be the same for fire extinguisher hose assemblies equipped with a shutoff nozzle at the end of the hose as the associated extinguisher unit. 8.3.3.3

The State Fire Marshal's Office is not to be considered a source of training in the inspection, maintenance, recharging and testing of fire extinguishers. The information provided is given as a reference to the licensing and certification examinations for portable fire extinguishers only.

Fire extinguishers suppliers and or management shall provide manuals, training, courses and hands on practical experience. NFPA 10, requires, "A person that has been certified by a recognized organization through a formal certification program or by manufacturer that has a certification program, that is acceptable to the authority having jurisdiction. It is the concern owners responsibility to have their employees properly trained and certified, in that, "Every concern shall be responsible for the acts of its employees insofar as such acts apply to the marketing, sale, distribution, and servicing of any portable fire extinguisher" R710.3.17.

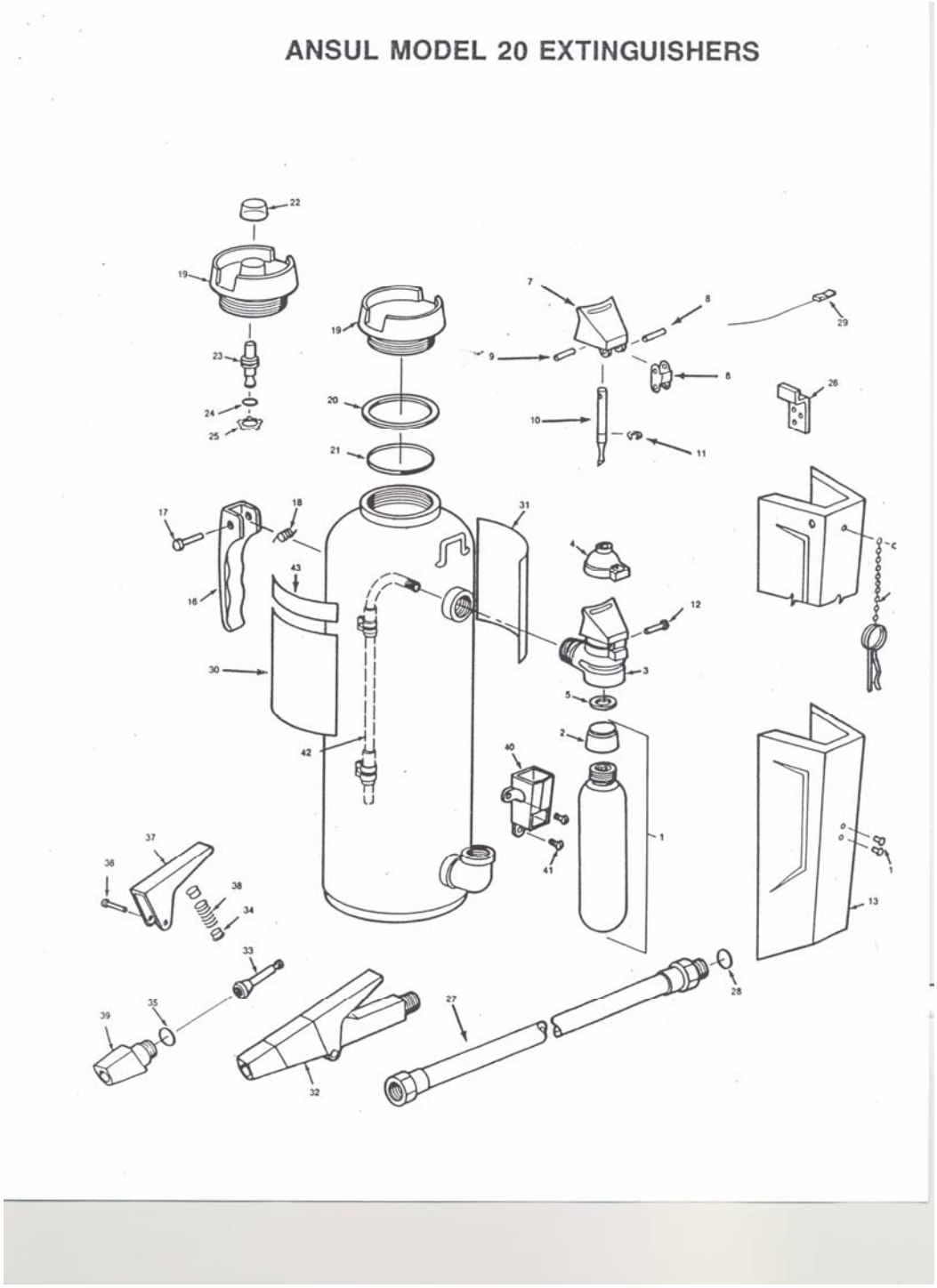
ANNEX I - Utah State Fire Marshal Tag and Label Format

UTAH STATE FIRE MARSHAL TAG AND LABEL FORMAT



4 ML. VINYL OR MYLAR TYPE MATERIAL MUST BE WEATHER PROOF
TAGS ARE SHOWN ACTUAL SIZE

ANNEX II – Ansul Model 20 Fire Extinguisher Schematic



ANNEX III – Ansul Technical Bulletin Number 51

Technical Bulletin

ANSUL

Number 51

Re-Use of Dry Chemical Agents

ANSUL FIRE PROTECTION
MARINETTE, WI 54143

Background

The NFPA Standard for Portable Fire Extinguishers (NFPA 10-1981) requires a six-year teardown of stored pressure type dry chemical extinguishers and the state of California requires a teardown on an annual basis. It may also be necessary to empty cartridge operated extinguishers on the occasion of a hydrostatic retest procedure, or for other reasons. Consequently, questions have arisen relative to the re-use of dry chemical agent which has been removed from the extinguishers.

The information presented in the bulletin reflects the results of tests conducted by Ansul, the consensus opinion of our technical experts, and out considerable field experience over many years.

Dry Chemical Composition

Quality dry chemical extinguishing agents consist of a carefully balanced mixture of particle sizes. This is known as particle size distribution. Any event which changes this particle size makeup and distribution can seriously affect the extinguishing effectiveness of the agent. Accordingly it is important to the optimum performance of an extinguisher that the integrity of the dry chemical be maintained in the state in which it left the manufacturing process.

Emptying by Discharge

We have found that the discharge of dry chemical from a pressurized extinguisher by means of the normal operation of the unit into an open container or discharge bag will result in an unacceptable loss of the essential fine particles of the agent. This method of agent capture has been shown to upset the particle size distribution through the loss of at least 2% of the particles. Since most of the loss involves the "fine" particles, there is a consequent adverse affect on the extinguishing effectiveness of the agent.

Emptying by Dumping

Cartridge operated and unpressurized stored pressure extinguishers can be emptied by dumping the dry chemical into an open container such as a pail or drum. Tests have shown that this recapture method may also result in the loss of some fine particles. This change in the particle size distribution, while not nearly as severe as with the discharge method described above, can affect the extinguishing effectiveness of the agent.

Contaminants

The effects of humidity and moisture can adversely affect the storage, discharge and extinguishing characteristics of a dry chemical agent. It has been established that any means of recapturing dry chemical which is open to the atmosphere may result in moisture contamination, with subsequent caking and lumping of the agent. This contamination process increases in severity in atmospheres characterized by high relative humidity and low temperatures.

Closed Vacuum Recapture

Tests have shown that when a properly functioning vacuum fill/discharge machine or device is used to recapture dry chemical, the integrity of the particle size distribution can be maintained and the danger of moisture contamination greatly reduced. Such devices are available from a number of sources.

Recommendations

Based on our experience and evaluation of test results, we recommend that persons who wish to re-use dry chemical agents carefully follow these guidelines:

- Select a dry, warm and preferably enclosed location, with atmospheric conditions of not more than 55% relative humidity and ambient temperatures of not less than 65° F (18° C).
- Assure that any device used to hold or store the dry chemical is absolutely dry and clean.
- Never discharge a pressurized extinguisher's dry chemical into any container which is open to the atmosphere — use a vacuum fill/discharge device in good condition.
- The preferred method of recapture of dry chemical emptied from a non-pressurized extinguisher is to use a closed vacuum fill device. However, if the constraints outlined above are closely followed, the agent may be re-used after being dumped into an open container. Exposure to the atmosphere must be kept to a minimum.
- If an acceptable device or means for recapturing the dry chemical is not available, discard the old agent and refill the extinguisher with a fresh supply of the recharge agent specified on the extinguisher label.

Form No. F-8202 Litho in U.S.A.